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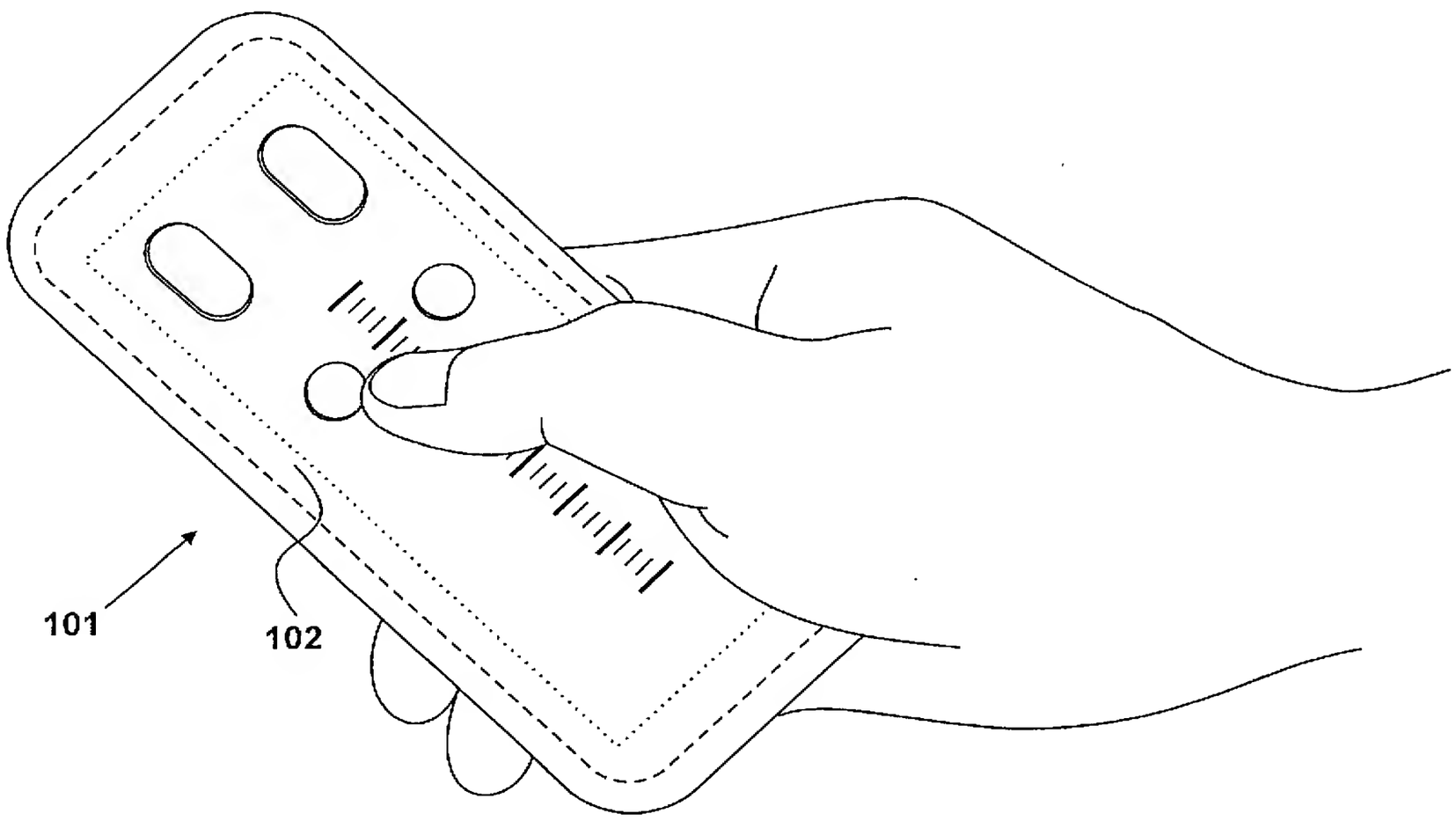
(54) Title: MANUALLY OPERABLE REMOTE CONTROLLER



(57) Abstract: A manually operable controller has a power supply (302), a processing device (303), an output device (305) and a fabric cover (102). The fabric cover is configured to produce input signals to the processing device in response to manual pressure applied thereto. In this way, it is possible for the device to be substantially soft as an alternative to presenting a hard plastic cover with buttons extending therefrom. Substantially the whole of the surface of the device may be used to provide interactions and the device may be provided with an orientation detector (304) so as to provide a first functionality, such as that of a television remote control, and a second functionality, such as that of a computer input device.

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Manually Operable Remote Controller

Background of the Invention

1. Field of the Invention

The present invention relates to a manually operable remote controller, comprising processing means and output means.

2. Description of the Related Art

Many forms of electronic equipment, such as television sets, video recorders, audio players and computers, are provided with manually operable controllers so as to allow an operator to provide input commands to the apparatus.

Usually, controllers of this type communicate without a physical wire or other physical connection, often using radio signals or infrared signals. Handheld infrared controllers for controlling television sets and related equipment have been known for some time and usually include buttons for channel selection and volume control etc. As an alternative to buttons, a remote controller in German Patent Publication No 19847553. This document describes a controller that is covered in sensors and, by making reference to a mathematical model, determines which fingers are being used at particular locations when the device is picked up. A user may then make reference to an on-screen menu such that particular fingers may activate particular functions irrespective as to where the fingers are positioned on the detector itself.

More recently, similar controllers have been used for providing input commands for computers, using radio links or infrared links with keyboards or other input devices such as a mouse.

Recently, there has been a trend towards combining the functionality of audio-visual equipment with computer equipment, allowing a conventional television receiver, for example, to view web pages and to perform other simple computing tasks. An integrated computer and television is described in European Patent Publication No 0 697 689. This makes use of a remote controller with buttons including specific buttons for changing between modes of operation.

Brief Summary of the Invention

According to an aspect of the present invention, there is provided a manually operable remote controller, comprising processing means and output means, characterised in that said controller is surrounded by a fabric cover, wherein said fabric cover includes a plurality of fabric layers configured to identify a location upon which finger pressure has been applied in response to voltages generated by said processing means.

Consequently, in accordance with the present invention, technology described in British Patent Publication No 2 350 431, assigned to the present applicant, is employed to provide a cover for a detector that is manually sensitive at many positions. Button areas are identified and the activation of one of these button areas is determined by identifying the position of a mechanical interaction.

In a preferred embodiment, the controller includes an orientation detector, so as to provide a first functionality in a first orientation and a second functionality in a second orientation. In this way, the controller may be configured to operate audio-visual equipment in the first orientation and the controller may be configured to operate computer equipment in the second orientation.

In a preferred embodiment, the controller includes an infrared transmitter.

Brief Description of the Several Views of the Drawings

Figure 1 shows a manually operable controller embodying the present invention;

Figure 2A shows a first side of the controller shown in *Figure 1*;

Figure 2B shows the opposing side of the controller shown in *Figure 1;*

Figure 3 shows a cross-sectional view of the controller shown in *Figure 1;*

Figure 4 shows an exploded view of the fabric cover shown in *Figure 1*; and

Figure 5 details the control circuit shown in *Figure 4*.

Written Description of the Best Mode for Carrying Out the Invention

A manually operable controller **101** is shown in *Figure 1*. The controller is not fabricated with a rigid outer plastic shell but consists of a relatively soft material, such as a sponge, surrounded by a fabric. Mounted within the sponge there is a power supply, a processing device and an output device. These are then surrounded by cover **102** that is configured to produce input signals to the processing device in response to manual pressure applied thereto. Thus, the soft controller does not have hard manually responsive buttons contained therein. The device is configured such that the outer fabric cover itself is sensitive to pressure being applied thereto.

An upper surface **201** is shown in *Figure 2A* and an opposing lower surface **202** is shown in *Figure 2B*. Upper surface **201** provides the

functionality of a television remote controller. Lower surface **202** provides the functionality of a computer interface. The device includes an orientation detector such that when surface **201** is uppermost the processor is configured to operate in the mode of a television controller with the lower surface controls being disabled. Similarly, when face **202** is uppermost the controller provides the functionality of a computer input device and the television controls are disabled.

Television control surface **201** includes a first channel select button **203** and a second channel select button **204**. Operation of button **203** selects the next lowest numbered channel while operation of button **204** selects the next highest numbered channel. Button **205** allows brightness to be adjusted while button **206** allows contrast to be adjusted. Region **207** allows volume to be adjusted by movement of a finger forward in the direction of arrow **208**, in order to increase the volume, or in the opposite direction in order to reduce the volume.

Upon turning the controller through 180° as shown in *Figure 2B* its functionality changes to that of a computer input device. An orientation detector detects that this position has been selected, after which round buttons **211** allow alphanumeric characters to be selected while button **212** provides a return function and button **213** provides a shift function. In addition, a pointer displayable on a screen is configured to be manoeuvrable in response to manual movement supplied through a mouse pad region **214**. When movement occurs within region 214, while pressure is being applied, similar movement is reflected by an on-screen mouse cursor.

A cross-section of the detector shown in *Figure 1* is illustrated in

Figure 3. Manual interactions upon fabric **202** are detected by a detection circuit **301** that also receives power from a battery pack **302**. Battery pack **302** also provides power to a main processor **303** that in turn receives input signals from an orientation detector **304** and supplies output signals to an infrared transmitter **305**. Orientation detector **304** essentially includes a gravity-operated switch such that, irrespective of the orientation of the detector as a whole, a switch element **306** always adopts a downward orientation as illustrated in *Figure 3*. Processor **303** is configured to execute a first set of instructions to provide the functionality of a television controller when switch **306** is in a first position and is then programmed to provide the functionality of a computer input device when switch **306** is in its alternative position. Processor **303** may include sufficient memory for both instruction sets to be held simultaneously. Alternatively, program instructions may be overlaid into executable memory upon a change of orientation being detected.

The components **301** to **306** are housed within a soft, sponge-like material **307**, thereby giving the device a substantially soft feel. In this way it is possible to present the device in a form that is more consistent with the soft furnishings of a domestic environment as an alternative to a hard plastic casing. The device is also more robust and not easily broken.

An exploded view of fabric **102** is illustrated in *Figure 4*. The fabric position detector comprises two woven outer fabric layers **401** and **402**, separated by a central layer **403**. The central layer **403** is a layer of knitted fabric which may be made from conductive fibre only. Such fibre may, for example, be a carbon coated nylon fibre. However, in a preferred embodiment a yarn is used in the knit which is a mixture of insulating and

conducting fibres.

A first insulating mesh layer **404** is located between the upper fabric layer **401** and the central layer **403**. In addition, a second insulating mesh layer **405** is located between a lower fabric layer **402** and a central layer **403**. The insulating mesh layers **404** and **405** are made from polyester fabric of a warp knit construction. Fabric of this type is readily available and is similar to the fabric used for mosquito nets etc.

Electrically conductive fibres are used when weaving layer **401** and layer **402** such that layers **401** and **402** define two electrically conductive layers. Alternatively, layers **401** and **402** may be constructed from non-woven (felted) or knitted fabrics or may be of a composite structure. However, for any of these possible constructions, electrically conductive fibres are included in the production of the fabric, thus providing electrically conductive layers.

Two electrical connectors **406** and **407** are located on a rectangular insulating stripe **408** that is positioned along one edge of fabric layer **401**. The insulating stripe is produced by printing insulating ink onto the fabric but in an alternative construction, insulating adhesive tape may be employed. The connectors **406** and **407** provide a means of connection from the control circuit **205** to low resistance elements **409** and **410** respectively. The low resistant elements **409** and **410** are fabricated from fabric coated with metals such as nickel or silver. Material of this type is readily available and is used for shielding equipment from electromagnetic interference for example.

The low resistance elements are attached to the conductive fibre layer **401** and the insulating strip **408** by a conductive adhesive, such as a

pressure sensitive acrylic adhesive containing metalised particles. Consequently, portions **416** and **417** of the low resistance elements **409** and **410** make electrical contact with the conductive fibres of layer **401** along two of its opposing edges. The conductive adhesive assures a bond is formed between the low resistance elements **409** and **410** and the conductive fibres.

The lower fabric layer **402** has a similar construction to the upper fabric layer **401**, having connectors **411** and **412** located on an insulating stripe **413**. The connectors **411** and **412** provide a means for connecting the control circuit **205** with low resistance elements **414** and **415** respectively. Layer **202** is effectively rotated ninety degrees with reference to layer **401**. Thus, conducting portions **416** and **417** contact the conductive fibres in layer **401** along two opposing edges and the low resistance elements **404** and **405** have contacting portions **418** and **419** that contact the conductive fibres in layer **402** along the alternative opposing edges. A configuration of this type is detailed in the present applicant's international patent publication No WO 00/72239A1, the whole contents of which performs part of the present disclosure by reference. In a preferred embodiment, the assembly shown in *Figure 4* is covered by an additional fabric layer. In addition to providing a cosmetic finish to the controller, this outer fabric layer also provides a protective surface and facilitates the application of graphics and button shapes etc.

Control circuit **205** is detailed in *Figure 5*. The control circuit **205** supplies voltages to connectors **501**, **502**, **503** and **504** and provides output values at a serial communication output **505**. Resistors **506** and **507** have a resistance that is substantially similar to the resistance of the fabric detector

measured from a first connector layer **401** to the other connector layer **402**, while a typical target pressure is applied; values of 10 K Ohm are typical for resistors **506** and **507**.

A detection process is controlled by a program executed by a peripheral interface controller **508**, typically type PIC16C711. Controller **508** is also configured to supply output voltages at pins 1, 2, 10, 11, 12 and 13 and includes an analogue to digital converter that is used to process analogue voltages received at input pins 17 and 18.

Input pins 17 and 18 receive outputs from high impedance buffers **509**, **510**, typically being operational amplifiers of type TL062 operating at half unity gain to provide a high impedance buffer between the output voltages and the controller input ports.

Controller **508** has an external crystal oscillator running at four megahertz and connected across pins 15 and 16. A positive five volts supply is applied to pin 14 and ground is connected to pin 5. Pin 4 (the internal reset input) is held at positive five volts via a series resistor of 100 Ohm.

It can be appreciated that the present embodiment provides a remote controller that is more sympathetic to a domestic environment while allowing a greater degree of functionality.

Claims

1. A manually operable remote controller, comprising processing means and output means, characterised in that

said controller is surrounded by a fabric cover, wherein

said fabric cover includes a plurality of fabric layers configured to identify a location upon which finger pressure has been applied in response to voltages generated by said processing means.

2. A controller according to claim **1**, including an orientation detector, so as to provide a first functionality in the first orientation and a second functionality in the second orientation.

3. A controller according to claim **2**, wherein said controller is configured to operate audio-visual equipment in the first orientation.

4. A controller according to claim **3**, wherein said controller is configured to make channel selections and effect volume control.

5. A controller according to claim **2**, wherein said controller is configured to operate computer equipment.

6. A controller according to claim **5**, configured to allow alphanumeric key selections.

7. A controller according to claim **5**, configured to facilitate the operation of on-screen cursor movements within a mouse pad area.

8. A controller according to claim **1**, wherein said output means includes an infrared transmitter.

9. A method of manufacturing a remote control device, comprising the steps of

connecting an output means to a processing means;

constructing a fabric position detector in which electrically conductive fabric layers are separated by a partially insulating layer; and

configuring said processing means to apply a voltage to one of said conducting layers while measuring electrical characteristics of said second conducting layer.

10. A method of controlling equipment remotely, wherein a remote control apparatus has processing means and output means, characterised in that

said remote control is surrounded by a pressure sensitive fabric detector in which the application of manual pressure results in current flow between two electrically conducting fabric layers separated by a partially insulating layer, said method comprising the steps of

directing said output means towards said equipment; and

applying manual pressure to a selected portion of said pressure sensitive fabric.

11. A method according to claim **10**, wherein said detector is placed in a first orientation to provide a first functionality, whereafter, said detector is placed in an alternative orientation to effect a second functionality.

12. A method according to claim **11**, wherein said detector is used as a remote control for a television set when placed in said first orientation and wherein said detector is used for controlling a computer when placed in said second orientation.

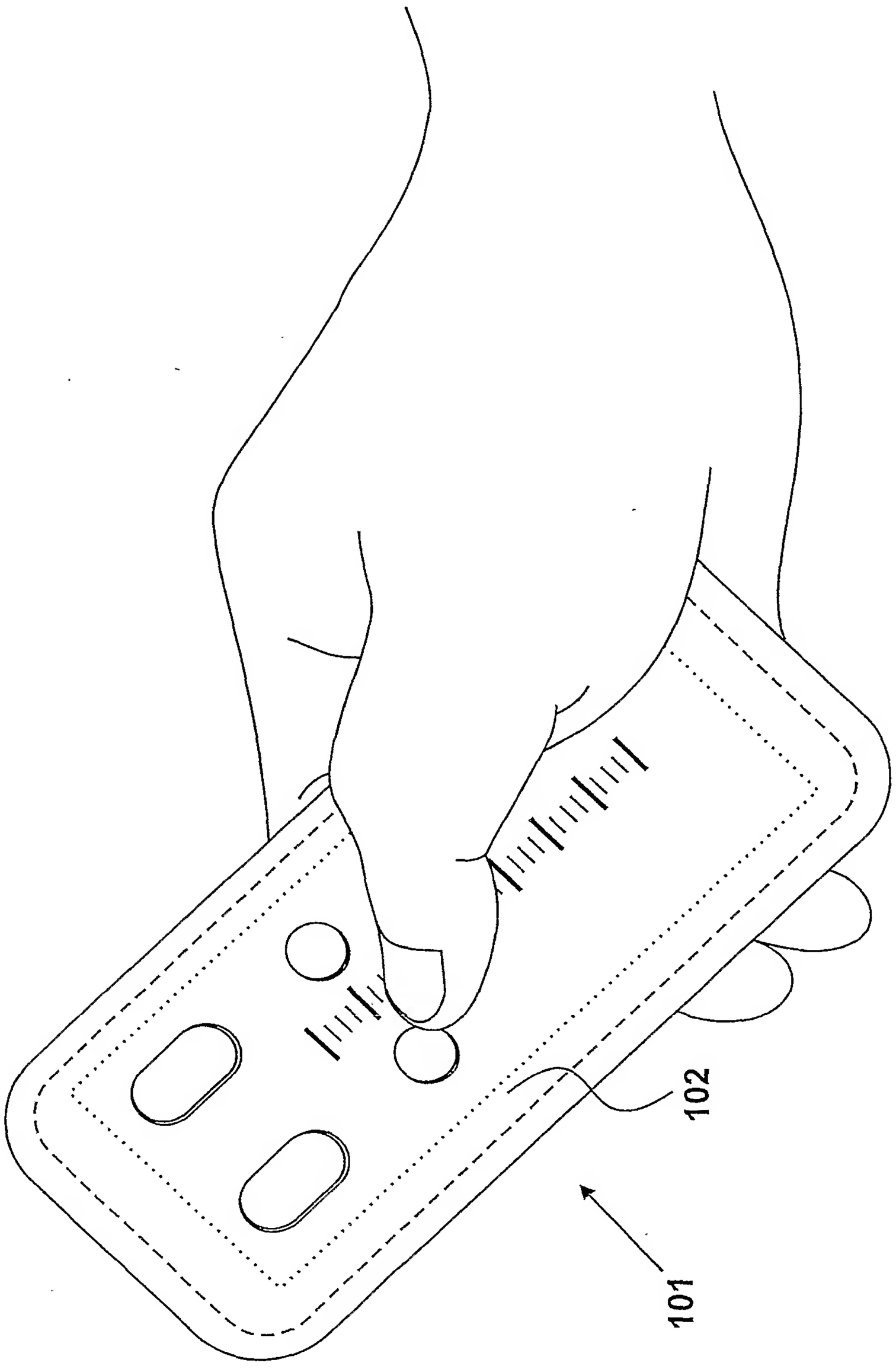

Figure 1

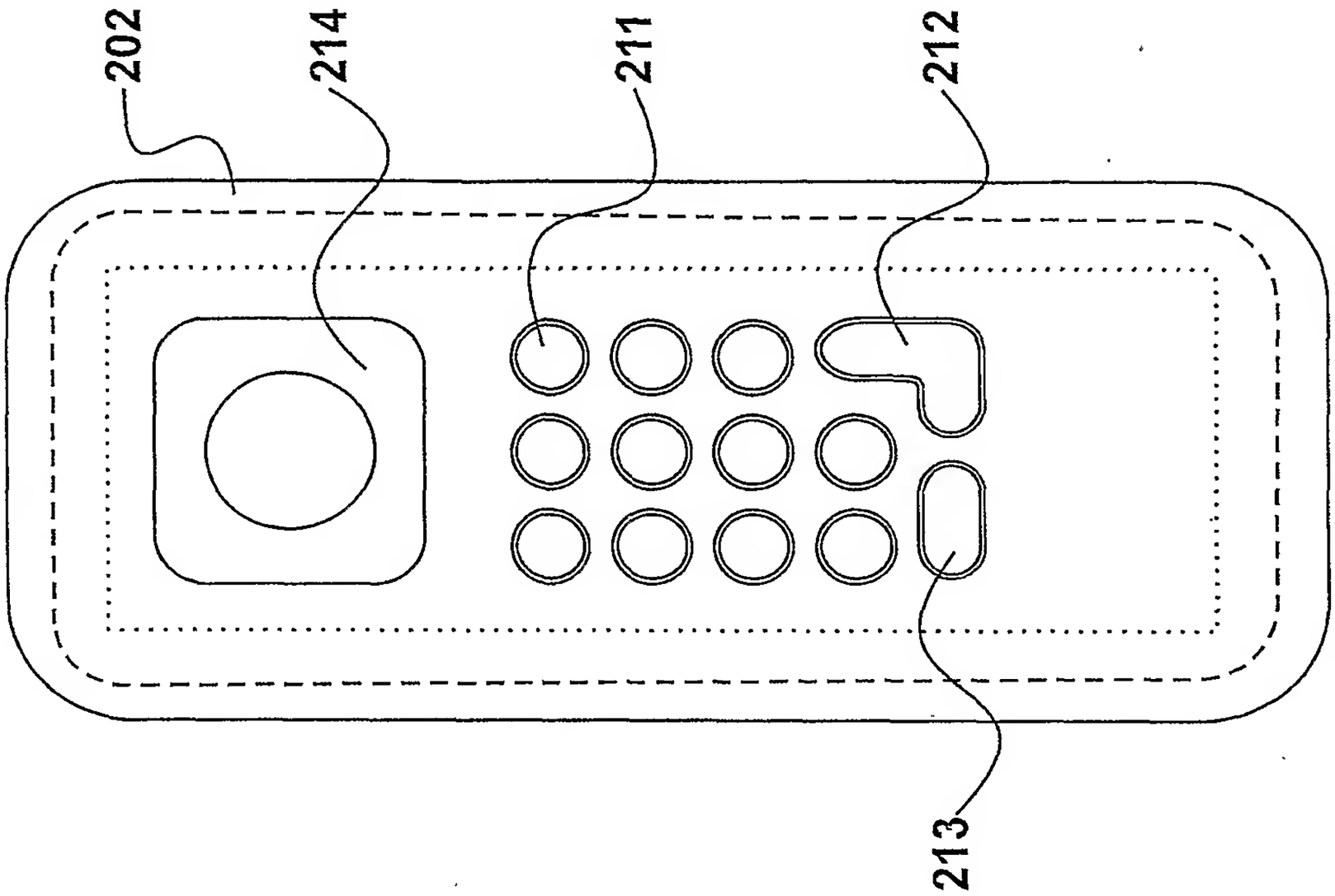

Figure 2B

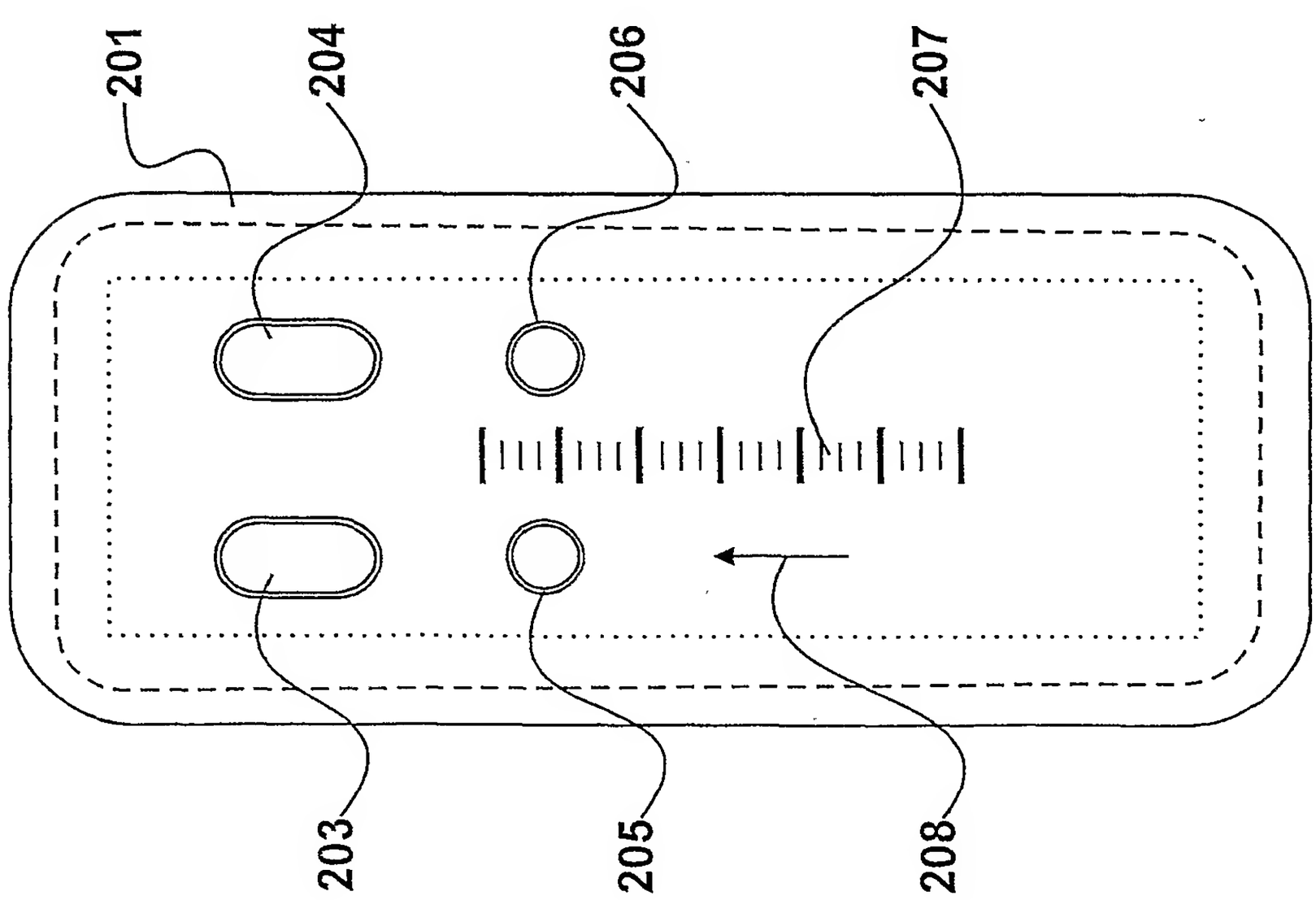

Figure 2A

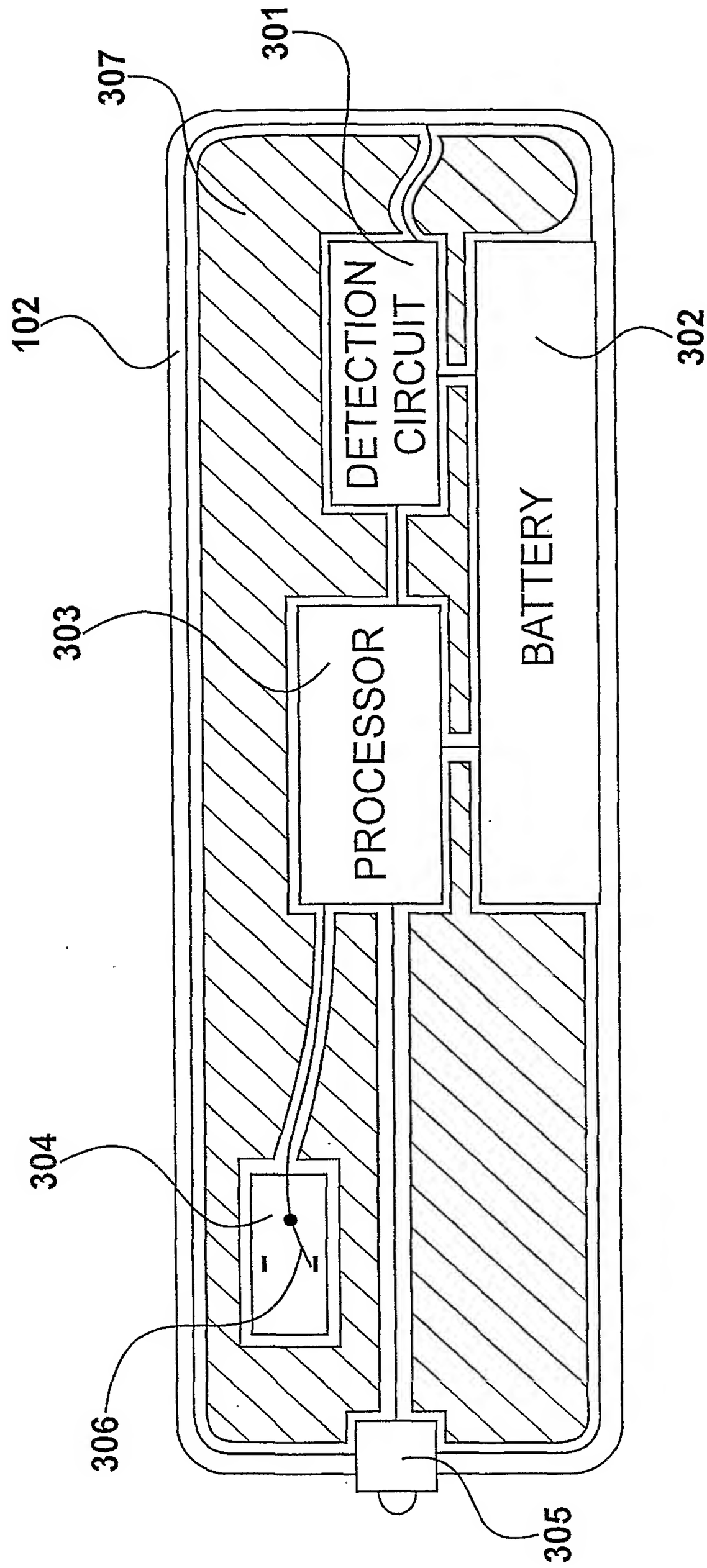
307
301
102
302
303
304
306
305
DETECTION CIRCUIT
PROCESSOR
BATTERY

Figure 3

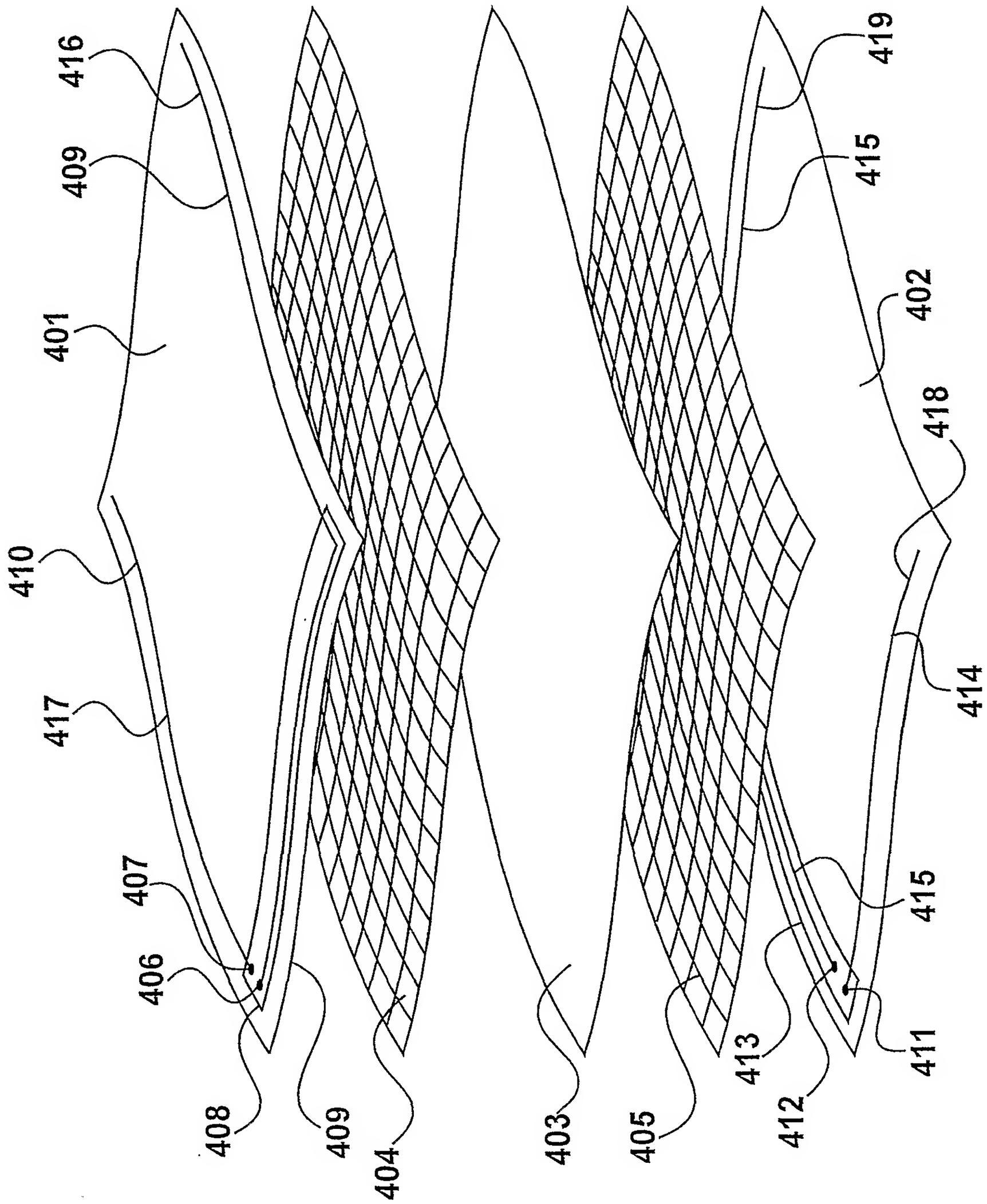
416
409
401
410
417
407
406
408
409
404
403
405
413
412
411
415
414
418
402
415
419

Figure 4

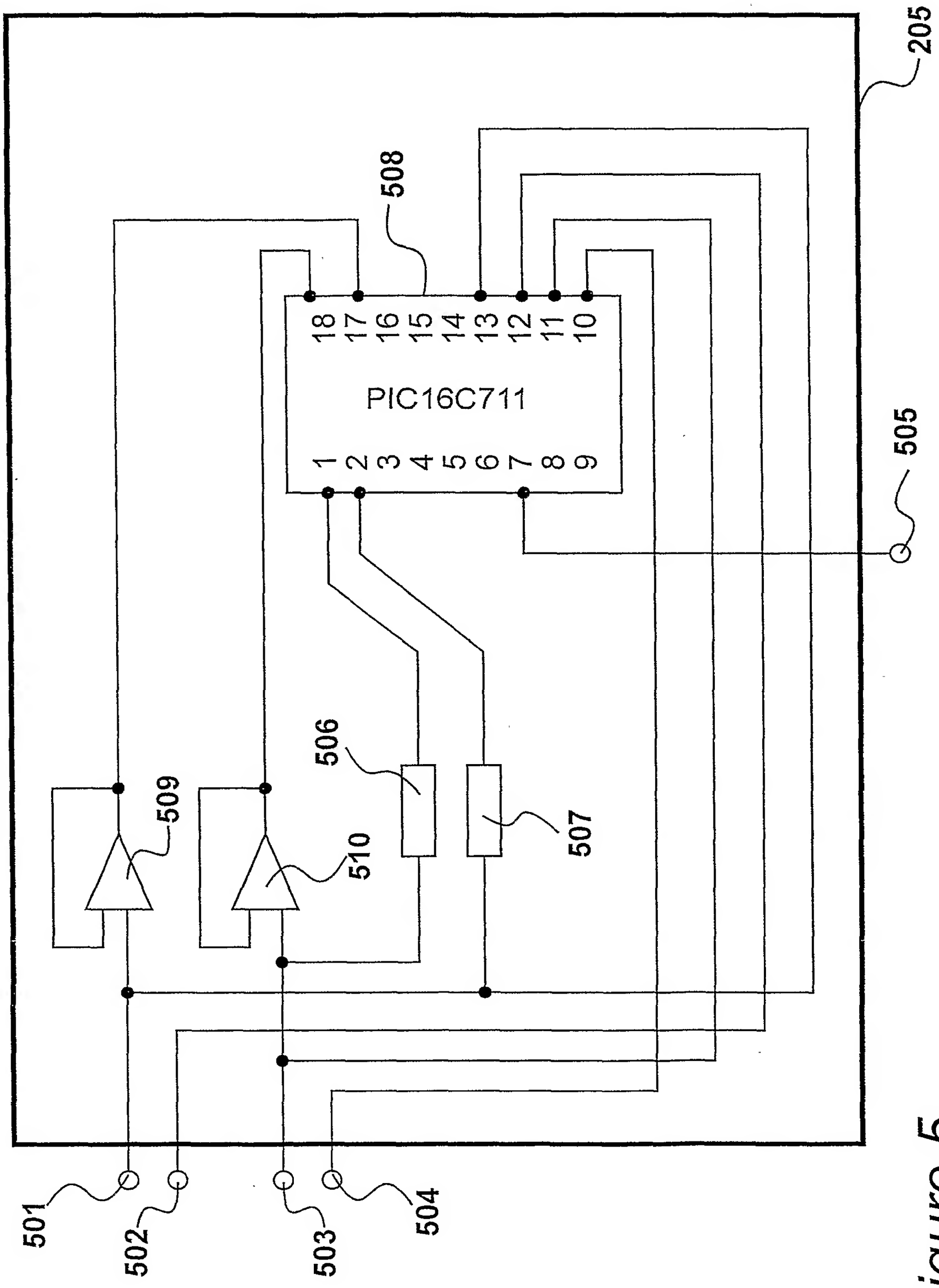
205
508
18 17 16 15 14 13 12 11 10
PIC16C711
1 2 3 4 5 6 7 8 9
505
506
507
509
510
501
502
503
504

Figure 5

PUB-NO: WO002052391A2

DOCUMENT-IDENTIFIER: WO 2052391 A2

TITLE: MANUALLY OPERABLE REMOTE CONTROLLER

PUBN-DATE: July 4, 2002

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ABSTRACT:

CHG DATE=20020802 STATUS=O>A manually operable controller has a power supply (302), a processing device (303), an output device (305) and a fabric cover (102). The fabric cover is configured to produce input signals to the processing device in response to manual pressure applied thereto. In this way, it is possible for the device to be substantially soft as an alternative to presenting a hard plastic cover with buttons extending therefrom. Substantially the whole of the surface of the device may be used to provide interactions and the device may be provided with an orientation detector (304) so as to provide a first functionality, such as that of a television remote control, and a second functionality, such as that of a computer input device.